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EXAMINER	
THOMAS, ERIC W	

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2831	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/842,975	HARRIS ET AL.	
	Examiner	Art Unit	
	Eric W Thomas	2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,14-34 and 36-93* is/are pending in the application.

4a) Of the above claim(s) *25-30* is/are withdrawn from consideration.

5)☒ Claim(s) *47-51* is/are allowed.

6)☒ Claim(s) *1-10,14-24,31-34,36-61 and 63-93* is/are rejected.

7)☒ Claim(s) *62* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Introduction:

The examiner acknowledges, as recommended in M.P.E.P. 707.04, the applicant's submission of the amendment dated 3/24/03. At this point, claims 1, 6, 10, 31, 32, 38, 39, 41, & 42 have been amended; claims 25-30 have been withdrawn from consideration; claims 11-13 and 35 have been cancelled; and claims 47-91 have been added. Thus, claims 1-10, 14-24, 31-34, 36-93 are pending in the instant application.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 31, 36-37, 74, 78-80, 92, & 96-97 are rejected under 35 U.S.C. 102(e) as being anticipated by Dhuler (US 6,215,644)

Regarding claim 31, Dhuler discloses a MEMS structure disposed within a peripheral region comprising: a substrate (16); a movable MEMS element (14, 22, 24, 32, 50) having outer ends permanently connected to the substrate, and a middle portion connected between the outer ends and free from the substrate; a stationary conductive MEMS element (12) in mechanical communication with the substrate and disposed adjacent the movable MEMS element, wherein a gap is disposed between the middle;

portion and the stationary conductive MEMS element; and a cap attached to the substrate having upper and side walls that encapsulate the stationary conductive MEMS element and the movable MEMS element.

Regarding claim 36, Dhuler discloses the movable MEMS element further comprises at least two conductive elements (28, 78).

Regarding claim 37, Dhuler discloses the at least two conductive elements are electrically isolated from each other.

Regarding claim 74, Dhuler discloses a MEMS structure disposed within a peripheral region (not shown) comprising: a substrate (16); a stationary element (12) extending from the substrate; a movable MEMS element having a portion that is free from the substrate and positioned adjacent the stationary element such that a variable-sized gap extends substantially parallel to the substrate and separates the movable MEMS element from the stationary element; and a cap (70) attached to the substrate having upper and side walls that encapsulate the movable MEMS element and the stationary element.

Regarding claim 78, Dhuler discloses the stationary element is conductive.

Regarding claim 79, Dhuler discloses the movable MEMS element further comprises at least tow conductive elements.

Regarding claim 80, Dhuler discloses the at least two conductive elements are electrically isolated from each other.

Regarding claim 92, Dhuler discloses a first substrate (16); a second substrate forming at least one conductive element that is in mechanical communication with the

substrate and that extends therefrom and a movable MEMS element having a portion that is free from the first substrate and defines a variable sized gap with respect to the at least on conductive element; and a third substrate different than the first substrate defining a cap having a base that is in mechanic communication with the first substrate so as to encapsulate the movable MEMS element (see col. 10 lines 20-50).

Regarding claim 96, Dhuler discloses the variable size gap extends substantially parallel to the substrate.

Regarding claim 97, Dhuler discloses the outer ends of the second substrate are connected to the first substrate and wherein a middle portion of the second substrate is connected between the outer ends and free from the first substrate.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 4-6, 8-10, 14-15, 22, 32-34, 38-46, 52-53, 56-58, 60-61, 63-64, 71, 73, 75-77, 81-91, and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhuler (US 6,215,644) in view of Bishop et al. (US 6,400,009).

Regarding claim 1, Dhuler discloses in fig. 5, 7E, a MEMS structure comprising: a substrate (16); at least one conductive element (12) that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element (14, 22, 24, 32, 50) having a portion that is free from the substrate and positioned such that a variable-sized gap extends substantially parallel to the substrate and separates the movable MEMS element from the at least one conductive element; and a cap (70) attached to the substrate inside a peripheral region having upper and side walls that encapsulates the at least one conductive element and the movable MEMS element.

Dhuler discloses the claimed invention except for at least one electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region.

Bishop et al. teach the use of a MEMS element having a stationary electrode and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the

MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 4, Dhuler discloses the cap (70) is conductive.

Regarding claim 5, Dhuler discloses the cap is formed from silicon (col. 10 lines 25-30).

Regarding claim 6, Bishop et al. teach the electrical trace is a doped polysilicon (see col. 4 lines 60-65).

Regarding claim 8, Dhuler discloses a bottom surface of at least one of the sidewalls of the cap is attached to the substrate.

Regarding claim 9, Bishop et al. teach the sidewalls are connected to the substrate at a location between first and second terminal ends of the at least one electrical trace.

Regarding claim 10, Bishop et al. teach the at least one electrical trace is disposed within an interface between the at least one conductive element and the substrate.

Regarding claim 14, Dhuler discloses the substrate is a dielectric material (non-conductive).

Regarding claim 15, Bishop et al teach the at least one electrical trace is in electrical communication with the substrate.

Regarding claim 22, Dhuler discloses the substrate is formed from a ceramic material.

Regarding claim 32, Dhuler discloses the cap separates the MEMS structure from the peripheral region. Dhuler discloses the claimed invention except for the MEMS structure further comprising: at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al. teach the use of at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal end in electrical communication with the peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal end in electrical communication with the peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 33, Dhuler discloses a second stationary MEMS element in mechanical communication with the substrate and disposed adjacent the movable MEMS element (28). Dhuler discloses the claimed invention except for a second electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al. teach the use of a MEMS element having an electrical trace having a first terminal end in electrical communication with a conductive

element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 34, Dhuler discloses a second stationary MEMS element in mechanical communication with the substrate and disposed adjacent the movable MEMS element. Dhuler disclose the claimed invention except for the a second electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al teach that it is well known in the art to connect electrical terminals to stationary MEMS elements to a region outside a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Dhuler using the teach of Bishop et al., since such a modification would provide electrical interconnection to the second stationary MEMS element.

Regarding claim 38, Dhuler discloses a MEMS structure surrounded by a peripheral region, the MEMS structure comprising: a substrate (16); at least one stationary conductive element (12) that is in mechanical communication with the substrate; a movable MEMS element (20,22, 24, 26, 14) disposed adjacent the at least

one stationary conductive element having outer ends permanently connected to the substrate, and a middle portion connected between the outer ends and free from the substrate

Dhuler discloses the claimed invention except for at least one electrical trace having a first terminal end in electrical communication with the at least one stationary conductive element and a second terminal end in electrical communication with the peripheral region.

Bishop et al. teach the use of a MEMS element having a stationary electrode and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 39, Dhuler discloses a cap (70) attached to the substrate inside the peripheral region having upper walls and side walls that encapsulate the at least one stationary element and the movable MEMS element.

Regarding claim 40, Bishop et al. teach that the second terminal extends outside the cap.

Regarding claim 41, Dhuler discloses a structure surrounded by a peripheral region (not shown): MEMS structure comprising: a substrate (16) extending along a lateral direction; first and second stationary conductive elements in mechanical communication with the substrate (12, 28);

a movable MEMS element (14, 20, 24, 26) disposed laterally adjacent the stationary conductive elements, and having outer ends permanently connected to the substrate, and a middle portion connected between the outer ends and free from the substrate. Dhuler discloses the claimed invention except for first and second electrical traces having first terminal ends is electrical communication with the first and second stationary elements, respectively, and having second terminal ends in electrical communication with the peripheral region.

Bishop et al. teach the use of a MEMS element having stationary elements and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using electrical traces having one end connect the first and second stationary conductive elements, the electrical traces having another end connecting the first and second stationary conductive elements to the peripheral region; since such a modification would provide an electrical interconnect to the MEMS structure.

Regarding claim 42, Dhuler discloses a cap (70) attached to the substrate inside the peripheral region having upper walls and sidewalls that encapsulate the stationary conductive elements and the movable MEMS element.

Regarding claim 43, Bishop et al. teach the second terminal ends extend outside the cap.

Regarding claim 44, Dhuler (as modified by Bishop et al.) second terminal ends are electrically isolated from each other (different elements).

Regarding claim 45, Dhuler discloses the movable MEMS element further comprises at least two conductive elements (24).

Regarding claim 46, Dhuler discloses the at least two conductive elements are electrically isolated from each other.

Regarding claim 52, Dhuler discloses in fig. 5, 7E, a MEMS structure comprising:

a substrate (16); at least one conductive element (12) that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element (14, 22, 24, 32, 50) having outer ends permanently connected to the substrate, and a middle portion connected to the outer ends that is free from the substrate and positioned such that a variable-sized gap extends substantially parallel to the substrate and separates the movable MEMS element from the at least one conductive element; and a cap (70) attached to the substrate inside a peripheral region (not illustrate)having upper and side walls that encapsulates the at least one conductive element and the movable MEMS element.

Dhuler discloses the claimed invention except for at least one electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region.

Bishop et al. teach the use of a MEMS element having a stationary electrode and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide an electrical interconnect to the MEMS element of Dhuler.

Regarding claim 53, Dhuler discloses the gap is a variable size gap that extends "substantially" parallel to the substrate.

Regarding claim 56, Dhuler discloses the cap (70) is conductive.

Regarding claim 57, Dhuler discloses the cap is formed from silicon (col. 10 lines 25-30).

Regarding claim 58, Bishop et al. teach the electrical trace is a doped polysilicon (see col. 4 lines 60-65).

Regarding claim 60, Dhuler discloses a bottom surface of at least one of the sidewalls of the cap is attached to the substrate.

Regarding claim 61, Bishop et al. teach the sidewalls are connected to the substrate at a location between first and second terminal ends of the at least one electrical trace.

Regarding claim 63, Dhuler discloses the substrate is a dielectric material (non-conductive).

Regarding claim 64, Bishop et al teach the at least one electrical trace is in electrical communication with the substrate.

Regarding claim 71, Dhuler discloses the substrate is formed from ceramic material.

Regarding claim 73, Dhuler disclose the claimed invention except for the material used to form the at least one conductive element. Silicon is a well-known material used in the art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the at least one conductive element form a silicon material, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 75, Dhuler discloses the claimed invention except for the MEMS structure further comprising: at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al. teach the use of at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal

end in electrical communication with the peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using at least one electrical trace having a first terminal end in electrical communication with the stationary conductive MEMS element and a second terminal end in electrical communication with the peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 76, Dhuler discloses a second stationary MEMS element in mechanical communication with the substrate and disposed adjacent the movable MEMS element (28). Dhuler discloses the claimed invention except for a second electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al. teach the use of a MEMS element having an electrical trace having a first terminal end in electrical communication with a conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 77, Dhuler discloses the stationary elements are electrically isolated from each other.

Regarding claim 81, Dhuler discloses a MEMS structure surrounded by a peripheral region (not illustrate), the MEMS structure comprising: a substrate (16); at least one stationary element that is in mechanical communication with the substrate; a movable MEMS element having a portion that is free from the substrate and positioned adjacent the stationary element such that a variable sized gap extends substantially parallel to the substrate and separates the movable MEMS element from the stationary element.

Dhuler discloses the claimed invention except for at least one electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region.

Bishop et al. teach the use of a MEMS element having a stationary electrode and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

Regarding claim 82, Dhuler discloses the movable MEMS element defines outer ends that are permanently attached to the substrate, and wherein the portion that is free from the substrate is connected between the outer ends.

Regarding claim 83, Dhuler disclose a cap attached to the substrate inside the peripheral region having upper walls and sidewalls that encapsulate the at least one stationary element and the movable MEMS element.

Regarding claim 84, Dhuler (as modified by Bishop et al.) the second terminal end extends outside the cap.

Regarding claim 85, Dhuler discloses a MEMS structure surrounded by a peripheral region, the MEMS structure comprising: a substrate (16); first and second stationary elements (12, 28) in mechanical communication with the substrate;
a movable MEMS element (14, 20, 22, 24, 26) having a portion that is free from the substrate and positioned adjacent the stationary elements such that first and second variable-sized gaps extend "substantially" parallel to the substrate and separate the movable MEMS element from the first and second stationary elements and first and second electrical traces having first terminal ends in electrical communication with the first and second stationary elements, respectively, and having second terminal ends in electrical communication with the peripheral region.

Dhuler discloses the claimed invention except for first and second electrical traces having first terminal ends is electrical communication with the first and second stationary elements, respectively, and having second terminal ends in electrical communication with the peripheral region.

Bishop et al. teach the use of a MEMS element having stationary elements and a movable electrode wherein an electrical trace having a first terminal end in electrical communication with the conductive element and a second terminal end in electrical

communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using electrical traces having one end connect the first and second stationary conductive elements, the electrical traces having another end connecting the first and second stationary conductive elements to the peripheral region; since such a modification would provide an electrical interconnect to the MEMS structure.

Regarding claim 86, Dhuler discloses the movable MEMS element defines outer ends that are permanently attached to the substrate, and wherein the portion that is free from the substrate is connected between the outer ends.

Regarding claim 87, Dhuler discloses a cap attached to the substrate inside the peripheral region (not shown) having upper walls and side walls that encapsulate the stationary elements and the movable MEMS element.

Regarding claim 88, Dhuler (as modified by Bishop et al.) disclose the second terminal ends extend outside the cap.

Regarding claim 89, Dhuler (as modified by Bishop et al.) disclose the second terminal ends are electrically isolated from each other.

Regarding claim 90, Dhuler discloses the movable MEMS element further comprises at least two conductive elements.

Regarding claim 91, Dhuler discloses the at least two conductive elements are electrically isolated from each other.

Regarding claim 93, Dhuler discloses the claimed invention except for a second electrical trace having a first terminal end in electrical communication with the second

stationary MEMS element and a second terminal end in electrical communication with the peripheral region. Bishop et al. teach the use of a MEMS element having an electrical trace having a first terminal end in electrical communication with a conductive element and a second terminal end in electrical communication with a peripheral region. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the MEMS device of Dhuler using an electrical trace having a first terminal end in electrical communication with the second stationary MEMS element and a second terminal end in electrical communication with a peripheral region; since such a modification would provide electrical connections to the MEMS device of Dhuler.

4. Claims 1-10, 14-24, 31, 52-60, 65-70, 72, 92-95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bishop et al (US 6,400,009) in view of Fujii (US 5,818,683).

Bishop et al. disclose in fig. 2, a substrate, an electrical trace having a first terminal end in electrical contact with a stationary MEMS element; and a second terminal end in electrical contact with a peripheral region, and a cap layer that encapsulates a MEMS structure, wherein the cap has upper and sidewalls. The cap is attached to the substrate inside a peripheral region (see fig. 2).

Bishop et al. disclose the claimed invention except for the MEMS device comprises: at least one conductive element that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element having a portion that is free from the substrate and positioned such that a variable-sized gap extends

"substantially" parallel to the substrate and separates the movable MEMS element from the at least one conductive element. It should be noted that the MEMS element of Bishop et al. is no way limited to the illustrated embodiment of fig. 2.

Fujii discloses in fig. 5, a MEMS structure comprising: at least one conductive element (8) that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element (13A) having a portion that is free from the substrate and positioned such that a variable-sized gap extends "substantially" parallel to the substrate and separates the movable MEMS element from the at least one conductive element. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Bishop et al., using the MEMS element of Fujii, since such a modification would provide the element of Bishop et al with a small variable capacitor having an excellent electrical strength, a high frequency stability and a large variability of electrostatic capacity even though it's a single element.

Regarding claim 2, Bishop et al. disclose the cap is non-conductive (see col. 3 lines 50-60).

Regarding claim 3, Bishop et al. disclose the cap is formed from a glass (see col. 3 lines 50-60).

Regarding claim 4, Bishop et al. disclose the cap is formed from a conductive material (see col. 3 lines 50-60).

Regarding claim 5, Bishop et al. disclose the cap is formed from a silicon material (see col. 3 lines 50-60).

Regarding claim 6, Bishop et al. disclose the claimed invention except for the electrical trace is formed from a metal material. Gold is a well-known material used as an electrical trace in the MEMS art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Bishop et al. using gold traces, since such a modification would provide a material that has low electrical resistance.

Regarding claim 7, (as seen above in claim 6) the at least one electrical traces is formed from a gold material.

Regarding claim 8, Bishop et al. disclose the bottom surface of at least one of the sidewalls of the cap is attached to the substrate.

Regarding claim 9, Bishop et al. disclose the sidewalls are connected to the substrate at a location between first and second terminal ends of the at least one electrical trace.

Regarding claim 10, Bishop et al. disclose the at least one electrical trace is disposed within an interface between the at least one conductive element and the substrate.

Regarding claim 14, Bishop et al. disclose the substrate comprises a non-conductive material (see col. 3 lines 50-60)

Regarding claim 15, Bishop et al. disclose the at least one electrical trace is in electrical communication with the substrate (see col. 3 lines 50-60).

Regarding claim 16, Bishop et al. disclose the substrate comprises a conductive material (see col. 3 lines 50-60).

Regarding claim 17, Bishop et al. (fig. 1) disclose the substrate further comprises a recess formed in the upper surface thereof.

Regarding claim 18, the modified Bishop et al. (*as modified by Fujii) the movable MEMS element inherently is disposed above and "substantially" aligned.

Regarding claim 19, Fujii teaches the movable MEMS comprises at least one conductive member (14) attached to a non-conductive base (5).

Regarding claim 20, Fujii discloses the claimed structure. Regarding the limitation, "the nonconductive base is selectively etchable from the conductive member" is a method of forming the device. The method of forming the device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight. In re STEPHENS, WENZL, AND BROWNE, 145 USPQ 656 (CCPA 1965)

Regarding claim 21, the modified Bishop discloses the claimed invention except for the insulation base is formed from a silicon dioxide. Silicon dioxide is a well know (glass) insulator. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the insulator layer from a silicon dioxide material, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 22, Bishop et al. disclose the substrate is formed from glass (see col. 3 lines 50-60).

Regarding claim 23, Bishop et al. disclose the substrate is formed from gallium arsenide (see col. 3 lines 50-60).

Regarding claim 24, Bishop et al. disclose the at least one conductive element is formed from a silicon (col. 4 lines 60-65).

Regarding claim 31, Bishop et al. disclose in fig. 2, a substrate, a cap attached to the substrate having upper and sidewalls that encapsulates a MEMS element.

Bishop et al. disclose the claimed invention except for the MEMS device comprises: at least one conductive element that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element having a portion that is free from the substrate and positioned such that a variable-sized gap extends "substantially" parallel to the substrate and separates the movable MEMS element from the at least one conductive element. It should be noted that the MEMS element of Bishop et al. is no way limited to the illustrated embodiment of fig. 2.

Fujii discloses in fig. 5, a movable MEMS element having outer ends permanently connected to the substrate, and a middle portion connected between the outer ends and free from the substrate; a stationary conductive MEMS element in mechanical communication with the substrate and disposed adjacent the movable MEMS element, wherein a gap is disposed between the middle; portion and the stationary conductive MEMS element.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Bishop et al. using the MEMS element of Fujii, since such a modification would provide the element of Bishop et al with a small variable capacitor

having an excellent electrical strength, a high frequency stability and a large variability of electrostatic capacity even though it's a single element

Regarding claim 52, Bishop et al. disclose in fig. 2, a substrate, an electrical trace having a first terminal end in electrical contact with a stationary MEMS element; and a second terminal end in electrical contact with a peripheral region, and a cap layer that encapsulates a MEMS structure, wherein the cap has upper and sidewalls. The cap is attached to the substrate inside a peripheral region (see fig. 2).

Bishop et al. disclose the claimed invention except for the MEMS device comprises: at least one stationary conductive element that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element having outer ends permanently connected to the substrate and a middle portion connected between the outer ends that is free from the substrate and positioned such that a gap separates the movable MEMS element from the at least one conductive element portion that is free from the substrate It should be noted that the MEMS element of Bishop et al. is no way limited to the illustrated embodiment of fig. 2.

Fujii discloses in fig. 5, a MEMS device comprising at least one stationary conductive element that is in mechanical communication with the substrate and that extends therefrom; a movable MEMS element having outer ends permanently connected to the substrate and a middle portion connected between the outer ends that is free from the substrate and positioned such that a gap separates the movable MEMS element from the at least one conductive element portion that is free from the substrate. It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to modify Bishop et al., using the MEMS element of Fujii, since such a modification would provide the element of Bishop et al with a small variable capacitor having an excellent electrical strength, a high frequency stability and a large variability of electrostatic capacity even though it's a single element.

Regarding claim 53, Fujii teaches the gap is a variable size gap that extends "substantially" parallel to the substrate.

Regarding claim 54, Bishop et al. disclose the cap is non-conductive (see col. 3 lines 50-60)

Regarding claim 55, Bishop et al. disclose the cap is formed from ceramic.

Regarding claim 56, Bishop et al disclose the cap is conductive.

Regarding claim 57, Bishop et al disclose the cap is formed from silicon (see col. 3 lines 50-60)

Regarding claim 58, Bishop et al. disclose the claimed invention except for the electrical trace is formed from a metal material. Gold is a well-known material used as an electrical trace in the MEMS art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Bishop et al. using gold traces, since such a modification would provide a material that has low electrical resistance.

Regarding claim 59, (as seen above in claim 6) the at least one electrical traces is formed from a gold material. Regarding claim 58, Bishop et al. disclose the electrical trace is a doped polysilicon (see col. 4 lines 60-65).

Regarding claim 60, Bishop et al. disclose a bottom surface of at least one of the sidewalls of the cap is attached to the substrate.

Regarding claim 65, Bishop et al. disclose the substrate comprises a conductive material (see col. 3 lines 50-60).

Regarding claim 66, Bishop et al. disclose the substrate further comprises a recess formed in the upper surface.

Regarding claim 67, the modified Bishop et al. (*as modified by Fujii) the movable MEMS element inherently is disposed above and "substantially" aligned.

Regarding claim 68, Bishop et al teach the at least one electrical trace is in electrical communication with the substrate.

Regarding claim 69, Fujii discloses the claimed structure. Regarding the limitation, "the nonconductive base is selectively etchable from the conductive member" is a method of forming the device. The method of forming the device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight. In re STEPHENS, WENZL, AND BROWNE, 145 USPQ 656 (CCPA 1965)

Regarding claim 70, the modified Bishop discloses the claimed invention except for the insulation base is formed from a silicon dioxide. Silicon dioxide is a well know (glass) insulator. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the insulator layer from a silicon dioxide material, since it has been held to be within the general skill of a worker in the art to

select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 72, Bishop et al. disclose the substrate is formed from silicon.

Regarding claim 92, the modified Bishop (as seen above in the independent claims) discloses a first underlying substrate; a second substrate forming at least one conductive element that is in mechanical communication with the substrate and that extends therefrom and a movable MEMS element having a portion that is free from the substrate and that defines a variable sized gap with respect to the at least one conductive element; and a third substrate different than the first substrate defining a cap having a base that is in mechanical communication with the first substrate defining a cap having a base that is in mechanical communication with the first substrate so as to encapsulate the movable MEMS element.

Regarding claim 93, the modified Bishop (as seen in the claims above) further comprises at least one electrical trace having a first terminal end in electrical communication with the at least one conductive element and a second terminal end in electrical communication with a peripheral region.

Regarding claim 94, Bishop et al. disclose the at least one electrical trace is embedded in a layer (silicon dioxide) between the first and second substrates.

Regarding claim 95, Bishop et al. disclose the layer is insulating (silicon dioxide).

Allowable Subject Matter

5. Claims 47-51 are allowed.

6. Claim 62 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach or fairly suggest (taken in combination with the other claimed features) a MEMS device comprising at least one electrical trace is disposed within an interface between the at least one conductive element and the substrate (claim 62).

Response to Arguments

8. Applicant's arguments with respect to claims 1-10, 14-24, 31-34, 36-46 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric W Thomas whose telephone number is (703) 305-0878. The examiner can normally be reached on Mon & Sat 9:00AM - 9:30PM; Tues-Fri 5:30PM-10:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on 703-308-3682. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ewt
June 28, 2003

Dean A. Reichard 6/28/03
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